Parasitization by *Trichogramma chilonis* Ishii (Hymenoptera: Trichogrammatidae) of Corn Earworm Eggs on Sweet Corn in Hawaii[1]

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Collective results of various studies suggest that *Trichogramma* spp. are the most commonly mentioned parasites of corn earworm, *Heliothis zea* (Boddie), in North America (Quaintance and Brues 1905, McColloch 1920, Hardwick 1965, Oatman 1966) and Hawaii (Vargas and Nishida 1980). Although corn earworm eggs on corn have been reported to be attacked by *Trichogramma* in Hawaii (Vargas and Nishida 1980), there have been no quantitative studies on the extent of parasitization. Since sweet corn in Hawaii is normally not treated with insecticides, parasitization of eggs may be important in formulating pest management strategies; therefore, a study of corn earworm eggs was made in fields where there were continuous plantings of sweet corn.

METHODS AND MATERIALS

To determine parasitization by *Trichogramma,* samples of corn earworm eggs were collected from the silks of 'Supersweet' sweet corn at the University of Hawaii Agricultural Experiment Station, Waimanalo Farm, Waimanalo, Oahu. The planting consisted of 50 rows, each 30 m long. During August 1976, 100 eggs were collected daily during the first 4 days of silking. Eggs were placed individually in glass vials, and held in a laboratory at 24.4 ° ± 2.2 °C, 50 ± 5% RH, and 12 h light until either the larva or parasite emerged.

The year round study of parasitization of corn earworm eggs by *Trichogramma* was conducted at Kamaaina Farms, Laie, Oahu, during September 1976 to August 1977. The variety, Supersweet, was planted weekly on 0.8-ha plots with cultivation according to local practices without the application of insecticides. To determine the percent parasitization, 100 eggs were collected randomly at monthly intervals from silks approximately 3 days old. Eggs were handled as described above. Weather data, max-min temperatures and rainfall, were recorded daily.

RESULTS AND DISCUSSION

The only parasite to emerge from corn earworm eggs was *Trichogramma chilonis* Ishii[3]. Egg parasitization in a typical summer planting on the 1st day after

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[3]Identified by H. Nagaraja, Commonwealth Institute of Biological Control, Indian Station, Bangalore 569006, India as *T. confusum* Vigianni. E. Oatman of the Department of Entomology, University of California, Riverside, Ca. 92521, has since presented evidence that this species is synonymous with *T. chilonis* Ishii.

silking was 44%; 2nd day, 62%; 3rd day, 82%; and 4th day, 92% (Fig. 1). Our observations and those by Nishida and Napompeth (1974) indicated that during the summer the highest numbers of corn earworm eggs on the silk were present 4-5 days after the start of silking. The high parasitization during periods of high egg density would suggest that *T. chilonis* behaves in a density dependent manner.

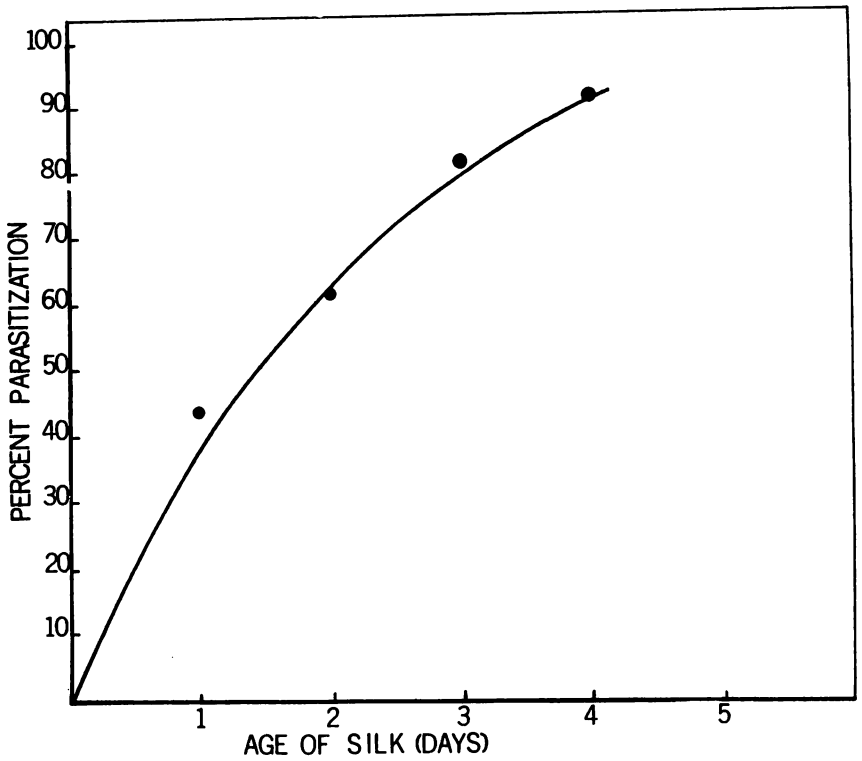

FIGURE 1. Relationship between parasitization of corn earworm eggs by *Trichogramma chilonis* and age of silk (days), University of Hawaii Agriculture Experiment Station, Waimanalo Farm, Waimanalo, Oahu, 1976.

At Laie, highest parasitization by *T. chilonis* occurred in August, while lowest parasitization occurred in December (Fig. 2). The mean parasitization was 32.1%. Parasitization probably would have been higher if egg samples had been taken from older silks. Oatman (1966) found egg parasitization by *T. pretiosum* Riley was as high as 100% on old silk. Nonetheless, the results in this study compare favorably with those in California where the average parasitization of corn earworm eggs on silks was found to be 38% (Oatman 1966).

Analysis of the data obtained indicated that there may be some relationship between parasitization and temperature. Regression of the arcsine transformation of percent parasitization vs. temperature (Fig. 3) indicated that there was a significant correlation ($P < .05$) between parasitization and temperature ($r = 0.79$). The relationship between parasitization and precipitation was of less importance than temperature ($r = 0.1$).

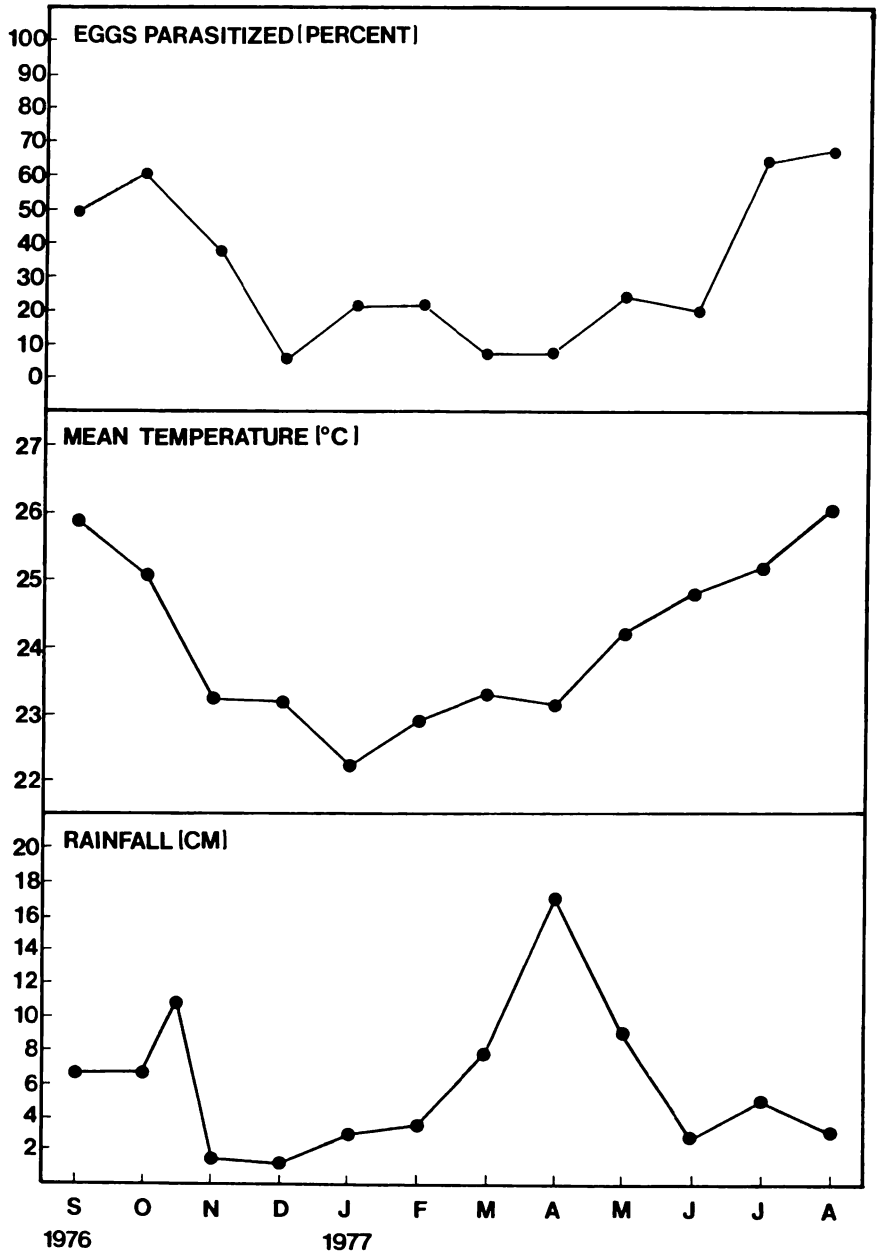

FIGURE 2. Seasonal trend in the incidence of parasitization by *Trichogramma chilonis* of corn earworm eggs and climatology data, Kamaaina Farms, Laie, Oahu.

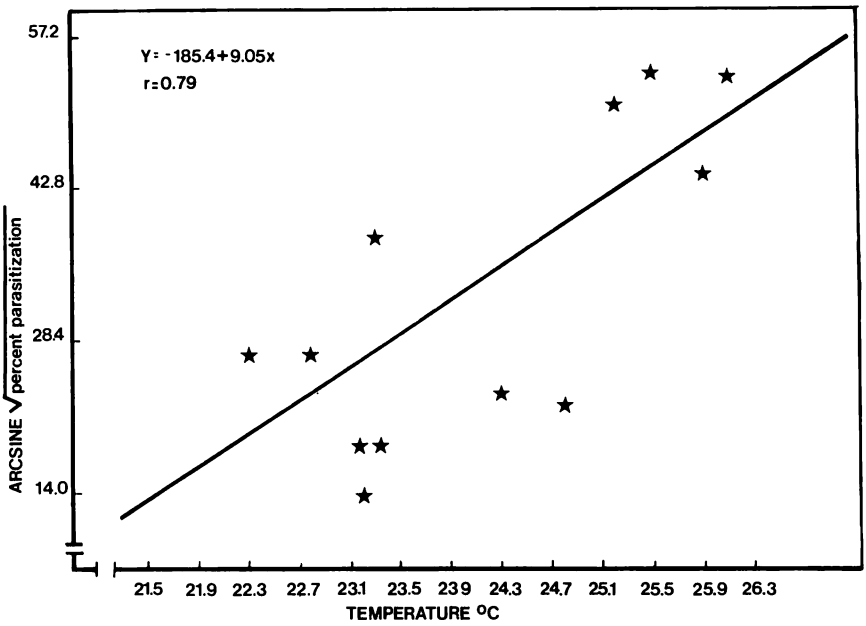

FIGURE 3. Regression of the number of corn earworm eggs parasitized by *Trichogramma chilonis* vs. temperature, Kamaaina Farms, Laie, Oahu, 1976-77.

SUMMARY

Parasitization of corn earworm eggs, *Heliothis zea* (Boddie), by *Trichogramma* was studied on continuous plantings of sweet corn near Laie, Oahu, and on the University of Hawaii Agricultural Experiment Station near Waimanalo, Oahu, during 1976 and 1977. *Trichogramma chilonis* Ishii was the only species reared from the eggs.

Under favorable summer conditions egg parasitization was as high as 92%. Year round studies at Laie showed an average of 32.1%. Data showed that density of corn earworm eggs and temperature affected the parasitization by *T. chilonis*.

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